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(56) Documents Cited

**US 5318942 A**

(58) Field of Search

UK CL (Edition S ) **B6C CGD**  
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(54) Abstract Title

**Sublimation transfer decoration**

(57) The three-dimensional surface of an article (10) is provided with a decoration by a method in which the decoration is printed, in reverse and using sublimable ink, on one side (22) of a plastics sheet (20): then the sheet (20) is vacuum-formed to bring its printed side into intimate, conforming contact with the surface of the article; then heat is applied to transfer the decoration from the printed side of the deformed sheet (20) to the surface of the article (10).

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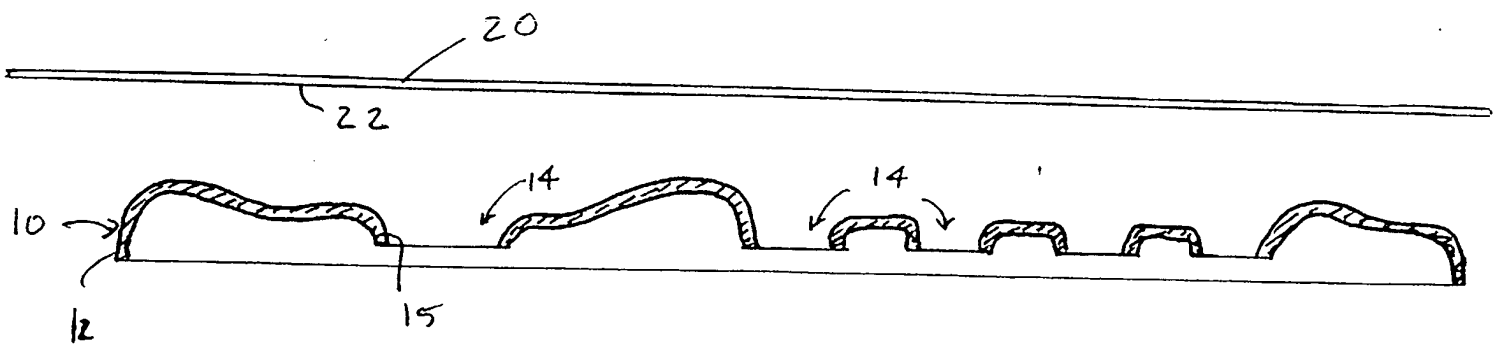


FIGURE 1

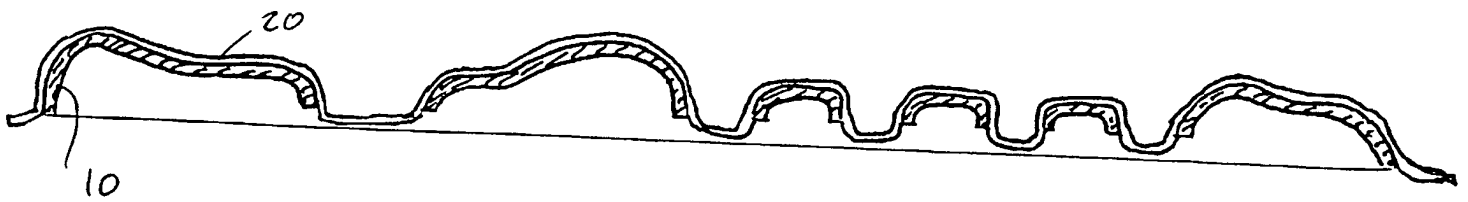


FIGURE 2

Sublimation Transfer Decoration

The present invention relates to a method of providing a three-dimensional surface of an article with a decoration, using a sublimation transfer technique.

There are nowadays a variety of articles to which it  
5 desirable to provide a decorative design. The sublimation transfer technique is capable of providing decorative designs to a high degree of definition: however, difficulties are encountered where the decoration is to be applied to a three-dimensional surface.

10 We have now devised a method of providing a three-dimensional surface of an article with a decoration, using a sublimation transfer technique, which is able to form the decoration to a high degree of definition.

In accordance with the present invention, there is  
15 provided a method of providing a three-dimensional surface of an article with a decoration, comprising the steps of printing a decoration, in reverse and using sublimable ink, on one side of a sheet of plastics material, positioning the printed sheet over the surface of the article to be decorated, with the  
20 printed side of the sheet facing said surface of the article, using heat and pressure to deform said sheet so that its printed side is brought into intimate contact with the article, over the three-dimensional surface thereof to be decorated, and then applying heat to transfer the decoration from the printed side of the deformed sheet to said three-dimensional surface of the article.

5 It will be appreciated that the plastics sheet is permanently deformed into intimate contact with the surface of the article to be decorated. The plastics sheet is impermeable, so that the gases generated from the ink, upon sublimation, are unable to escape: these gases therefore  
10 permeate in concentrated manner into the surface of the article

being decorated, to enhance the definition of the resulting decoration. Moreover, the vacuum-forming of the plastics film causes relatively little distortion of the film and correspondingly little distortion of the printed decoration.

5       An embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

FIGURE 1 is a schematic sectional view of a fascia for a mobile phone and a plastics film printed with a decoration,  
10 in sublimable ink, which is to be transferred to the front surface of the fascia; and

FIGURE 2 is a similar view showing the plastics film vacuum-formed into intimate contact with the surface of the fascia, prior to transfer of the decoration to the fascia.

15       Referring to the drawings, the method of the present invention will be described with reference to the application of a decoration to the front surface of the fascia of a mobile phone. The method of the invention may be used, however, for applying decoration to a wide variety of articles.

20       The mobile phone fascia is shown in longitudinal section at 10 and is formed of plastics material. The fascia has a peripheral rim 12 and is formed with a number of openings e.g. 14, for access to the liquid crystal display and numerical and function buttons of the phone (not shown) to which the  
25 fascia is intended to be secured. Each of these openings is formed with a peripheral rim, e.g. 15. The front of the fascia is contoured and it is desired to apply a decoration to the front of the fascia, and to continue this decoration over the peripheral rim 12 of the fascia and over the rims 15 of the  
30 openings 14.

In carrying out the method of the present invention, one side 22 of a plastics film 20 is printed with the required decoration, in reverse, using sublimable ink. Then the printed

film 20 is positioned over the front of the fascia 10: by a vacuum-forming process, the film 20 is then permanently deformed and brought into intimate contact with the fascia 10, over the surfaces to be decorated, as shown in Figure 2. The  
5 vacuum-forming of the printed film 20 is carried out at a temperature of typically 150°C, insufficient to effect sublimation of the ink printed on the plastics film 20. Subsequently, the sublimation transfer of the decoration is effected by raising the temperature to a higher level,  
10 typically 200 to 220°C.

The sublimation transfer may be carried out whilst the fascia 10 remains within the assembly in which the printed film is vacuum-formed to conform to the surface of the fascia. Alternatively, the fascia 10 and vacuum-formed film may be  
15 removed from the vacuum-forming assembly, then placed in a two-part mould, which holds the film in firm contact with the fascia, and is then heated to an appropriate temperature for the decoration to be transferred to the fascia.

It will be appreciated that the vacuum-forming of the  
20 film ensures that the printed side of the film is brought into intimate contact with the fascia, over all of the surface to be decorated. Because the film is impermeable, then the gases, generated from the ink upon sublimation, are unable to escape and therefore permeate in concentrated manner into the surface  
25 of the fascia, to enhance the definition of the decorative design thus formed on the fascia.

CLAIMS

- 1) A method of providing a three-dimensional surface of an article with a decoration, comprising the steps of printing a decoration, in reverse and using sublimable ink, on one side of a sheet of plastics material, positioning the printed sheet over the surface of the article to be decorated, with the printed side of the sheet facing said surface of the article, using heat and pressure to deform said sheet so that its printed side is brought into intimate contact with the article, over the three-dimensional surface thereof to be decorated, and then applying heat to transfer the decoration from the printed side of the deformed sheet to said three-dimensional surface of the article.
- 2) A method as claimed in claim 1, in which the step of applying heat to transfer the decoration, from the printed side of the deformed sheet to the three-dimensional surface of the article, is carried out in the same assembly in which the printed sheet is deformed into intimate contact with the surface of said article.
- 3) A method as claimed in claim 1, in which the step of applying heat to transfer the decoration, from the printed side of the deformed sheet to the three-dimensional surface of the article, is carried out in a different assembly from that in which the printed sheet is deformed into intimate contact with the surface of said article.
- 4) A method as claimed in claim 1 and substantially as herein described with reference to the accompanying drawings.



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Application No: GB 0021180.5  
Claims searched: 1-3

Examiner: A J Rudge  
Date of search: 6 July 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B6C(CGD)

Int Cl (Ed.7): B41M-1/30;1/40;5/035;B44C-1/17;1/18;1/24

Other: Online databases: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5,318,942 (Laudy)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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